

VI. Overview of Water Quality Information

Historically, Tennessee has been divided into three grand divisions: east, middle, and west (Figure 6). Some water quality problems like urban development and collection system problems occur throughout the state. However, other sources of pollution tend to be concentrated in certain areas of the state. More specific information on individual watersheds can be found in the section that begins on page 114.

The majority of the streams and reservoirs in Tennessee are fully supporting of their classified uses. Some of the streams and reservoirs in the state have been impacted by pollution and are only partially supporting of their designated uses. Even smaller percentages of the streams and reservoirs have received a not supporting designation due to severe impairment. This chapter generally discusses the overall results of the two-year assessment period.

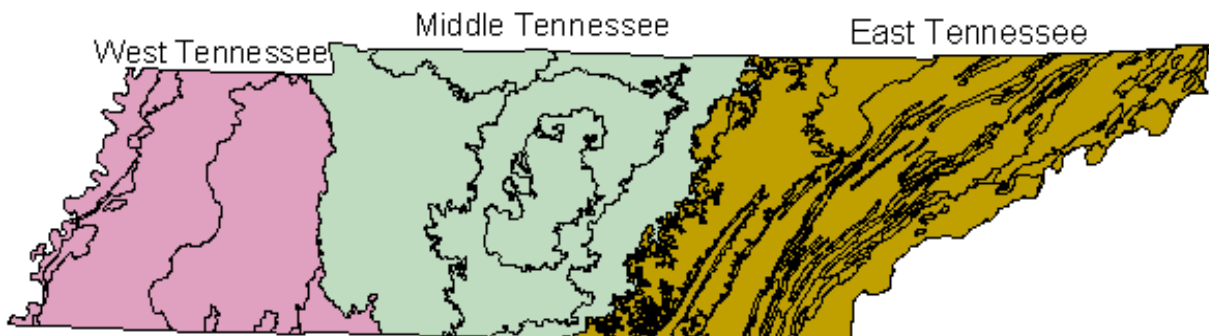


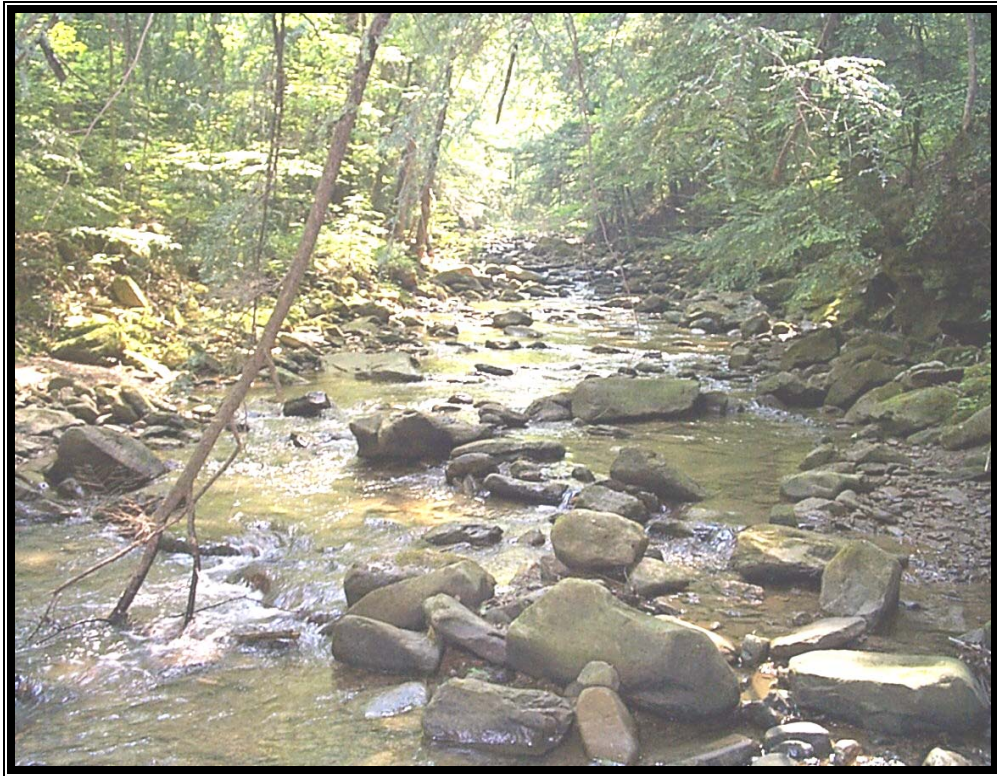
Figure 6: The Grand Divisions of Tennessee

Each of Tennessee's three grand divisions face different water quality challenges. East Tennessee is fortunate to have seven of the state's eight Outstanding Natural Resource Waters (ONRWs), the only Wild and Scenic River, and eight of the Scenic Rivers. Unfortunately, east Tennessee also has 10 of the state's 16 water bodies with fish consumption advisories.

Middle Tennessee's water quality is generally good, with the main threats being agriculture and urban development. This portion of the state has four designated Scenic Rivers, while only one reservoir currently has a fishing advisory.

West Tennessee has one ONRW, Reelfoot Lake, and one Scenic River, the Hatchie River. The primary impacts to streams and rivers in this part of the state are extensive channelization and intensive row cropping. Five waterways in the Memphis area are currently posted with fishing advisories due to chlordane and other organic substances.

1. East Tennessee



Blue Ridge Mountain Stream. (Photo provided by Jonathan Burr, Knoxville EAC)

ONRWs in East Tennessee:

- Obed River
- Big South Fork Cumberland River
- Middle Prong Little Pigeon River
- West Prong Little Pigeon River
- Abrams Creek
- Little River
- East Prong Little Pigeon River

Four major ecoregions are located in east Tennessee. These are the Blue Ridge Mountains, the Ridge and Valley, Central Appalachians, and the Southwestern Appalachians. Generally, water quality is very good in the mountain regions of east Tennessee. Most of the state's trout streams are located in the Blue Ridge ecoregion, including those streams that provide habitat for the native brook trout.

Seven of the eight formally recognized ONRWs are located in East Tennessee. These seven ONRW are portions of the Obed River, Big South Fork Cumberland River, Middle Prong Little Pigeon River, West Prong Little Pigeon River, Abrams Creek, Little River, and East Prong Little Pigeon River. Most of these ONRWs are located in state or federally protected areas.

Tennessee's only National Wild and Scenic River is the Obed River in the Cumberland Plateau. About 45 miles of the Obed River from the western border of the Catoosa Wildlife Management Area to the confluence with the Emory River including portions of Clear Creek and Daddy's Creek are included in the designation.

Wild and Scenic River:
➤ Obed River

East Tennessee also has eight of the state's Scenic Rivers designated by the legislature under the Tennessee Scenic River Act. Portions of Blackburn Fork, Clinch River, Conasauga River, French Broad River, Hiwassee River, Roaring River, Spring Creek, and Tuckahoe Creek are designated as Scenic Rivers.

Scenic Rivers:

- Blackburn Fork
- Clinch River
- Conasauga River
- French Broad River
- Hiwassee River
- Roaring River
- Spring Creek
- Tuckahoe Creek

Generally speaking, ridge and valley streams are more heavily altered by agriculture and urban development. Many of these streams have bacteria problems due to urban runoff, municipal bypassing, or dairy and other animal operations. Streams impacted by urban stormwater can be found in Chattanooga, Knoxville, Bristol, Kingsport, Johnson City, and other densely populated areas.

Six reservoirs have fishing advisories due to the accumulation of organic pesticides (primarily PCBs) in fish tissue. Nickajack, Tellico, Watts Bar, Melton

Hill, Boone and Fort Loudoun reservoirs currently have fishing advisories. Three streams, Chattanooga Creek, East Fork of Poplar Creek (PCBs and mercury), and North Fork of Holston River (mercury) also have fishing advisories. The fish consumption advisory on the Pigeon River was recently lifted. See Chapter IX for more specific information on fishing advisories.

Six east Tennessee rivers are impacted by flow alteration, low dissolved oxygen, or temperature alteration below dams. These rivers include: the Hiwassee River below Apalachia Dam, Ocoee River below Parksville Reservoir, Clinch River below Norris Reservoir, Holston River below Cherokee Reservoir, French Broad below Douglas Reservoir, and the South Fork Holston below Fort Patrick Henry Reservoir.

Both historical and current mining operations have impacted streams in east Tennessee. Several streams in the Cumberland Mountains and Cumberland Plateau continue to be impacted by runoff or discharges from either abandoned or active coal mining activities. Mining impacts downstream of the Copper Basin in Polk County are from historical copper smelting operations.

Pollutants from mining sites commonly include low pH, siltation, and elevated metals. These metals can impact aquatic life through direct toxicity, or they can deposit a thick precipitant that will limit habitat available to aquatic life.

2. Middle Tennessee



*Creech Hollow Branch is a typical middle Tennessee stream in Subcoregion 71f.
(Photo provided by Annie Goodhue, Nashville EAC.)*

The middle Tennessee region extends from the Cumberland Plateau to the western Tennessee River. The middle portion of the state consists of a single Level III ecoregion, the Interior Plateau. Middle Tennessee has four rivers that have been designated as Scenic Rivers: the Buffalo, Collins, Duck, and Harpeth rivers.

Scenic Rivers:

- Buffalo River
- Collins River
- Duck River
- Harpeth River

Water quality is generally good, but has been impacted in some areas by rapid urban development. Eleven streams currently have bacteria advisories due to urban runoff, municipal bypassing, or collection system problems. Cities with significant problems related to bypasses or discharges of inadequately treated wastes include Nashville, Franklin, Murfreesboro, Manchester, Tullahoma,

and Mt. Pleasant. Streams impacted by urban stormwater runoff have been documented in these cities as well as Clarksville, Columbia, and Lebanon.

Like the ridge and valley region of east Tennessee, many middle Tennessee streams are impacted by agriculture activities, predominantly livestock grazing. In certain areas, especially in southern middle Tennessee, intensive livestock feeding areas cause bacteriological problems. These agricultural activities as well as urban expansion have reduced the available habitat for stream life.

Only one middle Tennessee waterbody currently has a fish consumption advisory. The public has been advised to limit consumption of Woods Reservoir catfish due to elevated PCB levels.

Seven middle Tennessee streams located downstream of dams continue to be impacted by flow alteration, low dissolved oxygen, elevated metals, or temperature alteration. These streams include: the Duck River below Normandy Dam, the Elk River below Woods and Tims Ford Reservoirs, the Obey River below Dale Hollow Reservoir, the Caney Fork below Center Hill Dam, and Stones River below Percy Priest Dam.



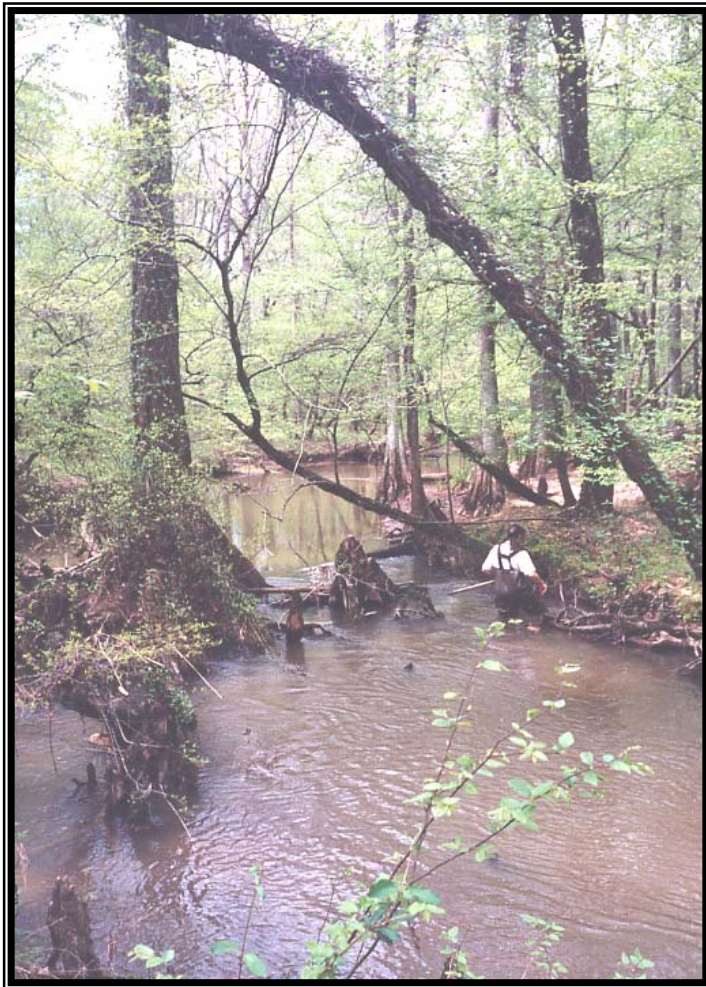
*McCrory Creek in the Stones River watershed.
(Photo provided by Annie Goodhue, Nashville EAC.)*

3. West Tennessee

The west Tennessee region extends from the Tennessee River to the Mississippi River. This region consists of four Level III ecoregions, Southeastern Plains, The Mississippi Valley Loess Plains, the Mississippi Alluvial Plains, as well as a small section of the Western Highland Rim of the Interior Plateau.

The predominant agricultural activity in west Tennessee is row cropping. Cotton, corn, soybeans, and wheat are common crops. However, intensive hog and chicken farming is increasing in this region.

One ONRW is located in the northwestern corner of the state, Reelfoot Lake. Reelfoot Lake is unique because it is the only large naturally-occurring lake in the state. Additionally, the Hatchie River has been designed as a Scenic River.



Division biologist Amy Fritz of the Jackson EAC collects a biological sample from an undercut streambank. (Photo by Sharon King, Mining, Jackson EAC.)

Many west Tennessee streams have been highly altered and water quality has been severely impacted. The widespread practice of channelization has the following detrimental effects:

- Destroys productive wetlands.
- Eliminates in-stream habitat for fish and other aquatic life.
- Increases downstream flood damage.
- Accelerates the transport of pollutants.
- Promotes the loss of fertile soil.
- Causes down cutting of the streambed until the creeks have water levels that can be considerably lower than the surrounding land.
- Creates “valley plugs,” downstream accumulations of sand.

**West Tennessee
Outstanding Natural
Resource Water:**

- Reelfoot Lake and its associated wetlands.

Scenic River:

- Hatchie River

Some west Tennessee streams continue to be impacted by poor quality municipal discharges or collection system overflows. Memphis and the rapidly developing surrounding counties have historical problems with urban stormwater runoff. Urban runoff is also a problem in Jackson, Union City, Dyersburg, and Brownsville.

The Mississippi River at Memphis, portions of Nonconnah Creek, the Loosahatchie River and Wolf River, currently have fishing advisories. These advisories were originally issued due to chlordane, a pesticide historically manufactured in Memphis.

However recent analyses have indicated other toxic substances as well including dioxin and PCBs.



*Cypress Creek is a typical slow moving west Tennessee stream.
(Photo by Amy Fritz, Jackson EAC.)*

A. Water Quality in Streams and Rivers

1. Overall Use Support

According to EPA's Reachfile 3 database, there are 60,226 miles of streams in Tennessee. Using recent specific data, the Division was able to assess almost half (29,406 miles) of the stream miles in the state (Table 3 and Figure 7). Most of the streams not assessed are very small or inaccessible tributaries to larger streams that have been assessed.

Table 3: Assessed Stream Miles

- A total of 20,490.0 of the assessed stream miles (69.7%) are fully supporting their designated uses.
- An additional 33.6 miles (0.1%) have been assessed as fully supporting, but threatened. Threatened streams are those that are currently meeting water quality standards, but the Division has reliable data indicating a downward trend in water quality that will likely lead to a decline in water quality status in two years.
- 7,183.7 stream miles (24.4%) are assessed as partially supporting due to a definite degree of impairment.
- 1,698.7 stream miles (5.8%) are considered not supporting due to severe impairment.

Stream Assessment	Miles
Total Assessed Miles	29,406.0
Fully Supporting	20,490.0
Fully Supporting, but Threatened	33.6
Partially Supporting	7,183.7
Not Supporting	1,698.7
Not Assessed	30,820.5
Total Miles	60,226.5

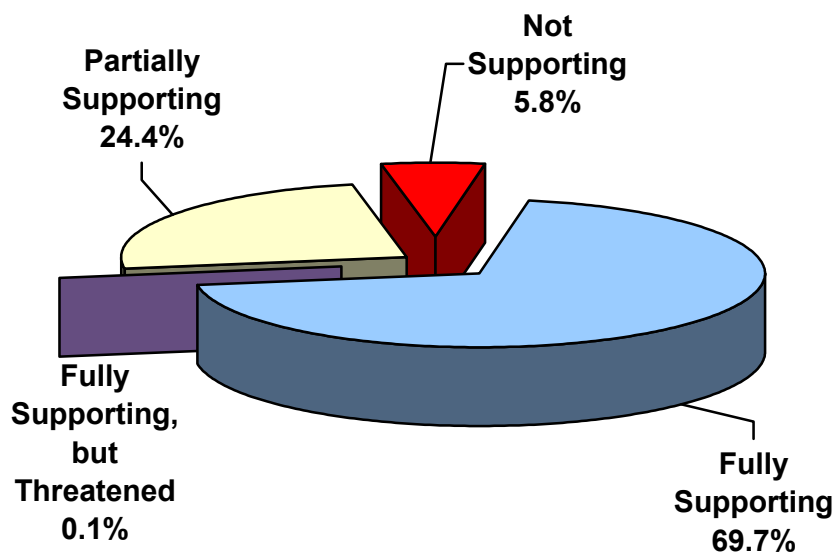
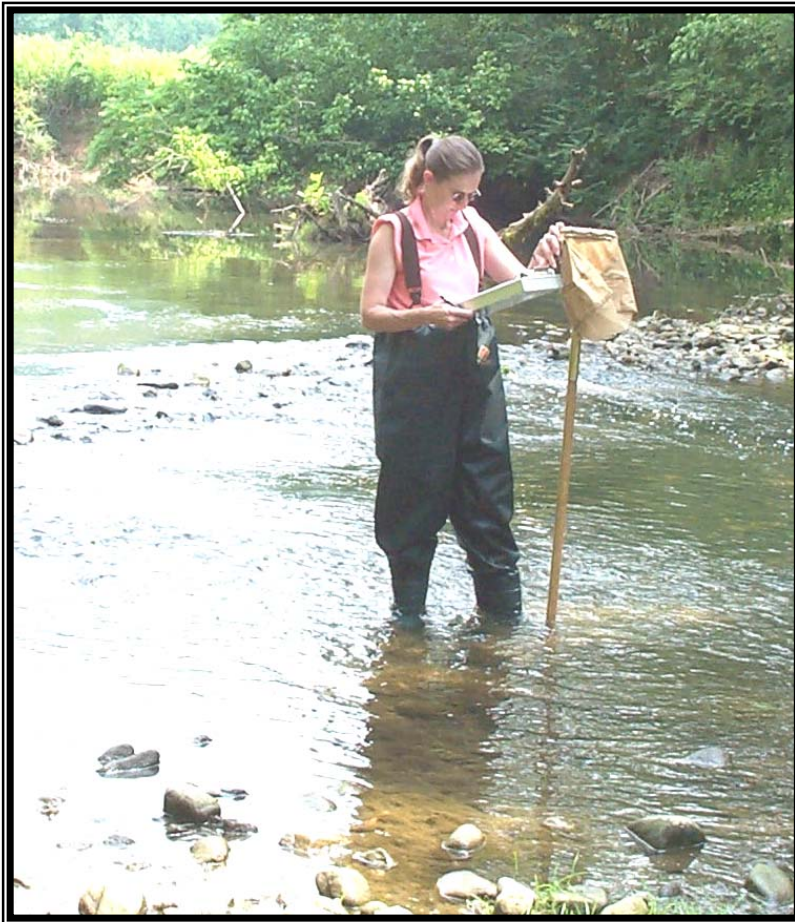


Figure 7: Percent Use Support in Assessed Rivers and Streams

2. Support of Individual Uses for Streams and Rivers

For each stream in Tennessee, overall use support has either been assessed or the stream has been called “not assessed” if no recent data are available. Additionally, the degree of support of individual uses has also been assessed, if possible. At times, a stream can be assessed for one use, but not another.

The two sets of criteria most commonly violated are for fish and aquatic life protection and recreation. About 30 percent of the stream miles that can be assessed for recreational use violated those standards. A little over 26 percent of the assessed stream miles violated fish and aquatic life standards. Less than one percent of the streams were assessed as violating the domestic water supply use criteria. All waters classified for irrigation, navigation, and industrial water supply uses were found to be fully supporting (Table 4 and Figure 8).



*Chattanooga
EAC biologist
Tammy
Hutchinson
collects a
biological
sample from the
riffle area
of a stream.
(Photo by Terry
Whalen,
Chattanooga
EAC.)*

Table 4: Individual Classified Use Support for Rivers and Streams

Designated Uses	Miles Of Stream Classified	Classified Miles Assessed	Miles Meeting Use	Percentage Of Assessed Miles Meeting Use*
Fish and Aquatic Life Protection	60,226.5	28,944.7	21,327.1	73.7%
Recreation	60,222.6	11,749.5	8,232.3	70.1%
Irrigation	60,222.6	29,346.8	29,346.8	100.0%
Livestock Watering and Wildlife	60,222.6	29,074.1	29,059.7	99.9%
Domestic Water Supply	3,586.1	3,586.1	3,565.0	99.4%
Navigation	844.0	844.0	844.0	100.0%
Industrial Water Supply	3469.6	3469.6	3469.6	100.0%

Note- All streams are classified for more than one use, but may or may not have all uses impacted. Thus, this table cannot be used to derive percentages for overall use support in Tennessee. Also, assessment rates for individual uses may not match overall use assessment rates.

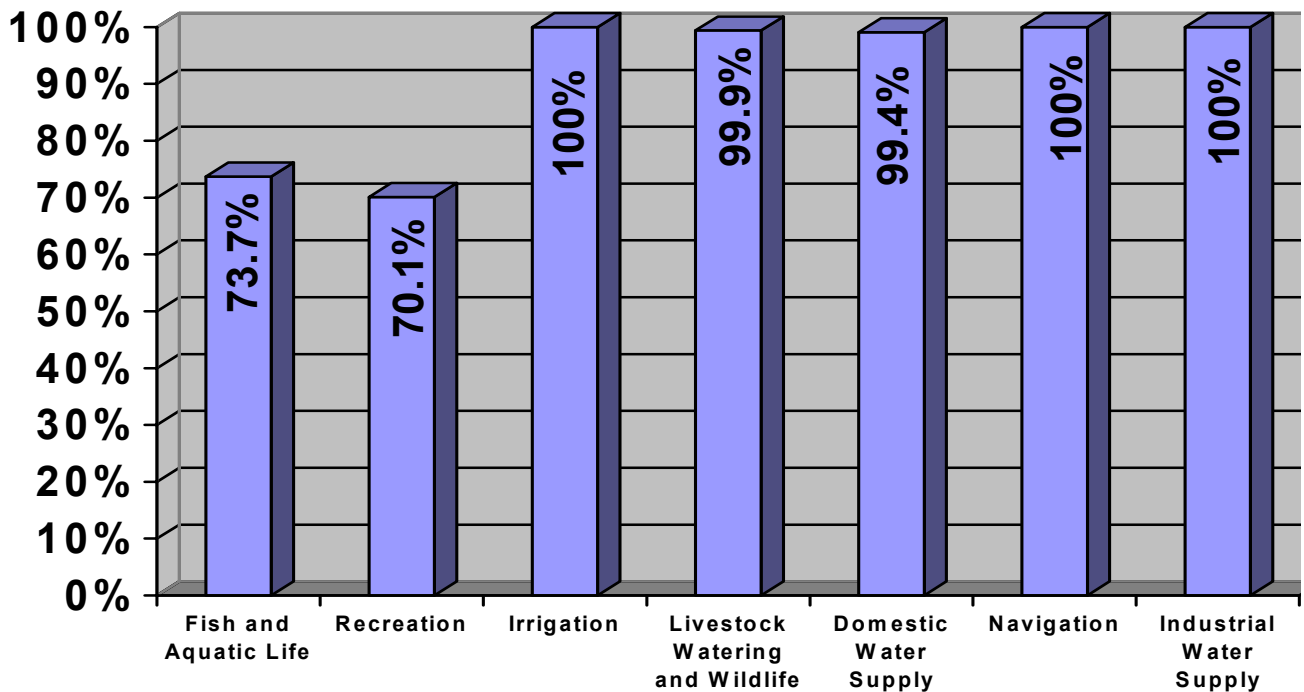


Figure: 8: Percent Use Support for Individual Classified Uses in Assessed Rivers and Streams

B. Water Quality in Reservoirs and Reelfoot Lake

1. Overall Lake Use Support

Table 5: Assessed Lake Acres

Lakes Assessment	Acres
Total Assessed Acres	530,629
Fully Supporting	416,743
Fully Supporting, but Threatened	0
Partially Supporting	26,872
Not Supporting	87,014
Not Assessed	6,165
Total Acres	536,794

Tennessee has 92 publicly owned reservoirs or lakes that total 536,794 lake acres. For the purpose of this report, a public reservoir or lake is a publicly accessible reservoir or lake larger than five acres.

Most lakes in Tennessee were created by the impoundment of a stream or river. One exception is Reelfoot Lake, thought to have been formed by a series of earthquakes in 1811 and 1812. Since natural processes formed Reelfoot Lake, it is categorized as a freshwater lake for assessment purposes. (Reelfoot Lake is not the only naturally formed lake in Tennessee, but it is the largest and the only one that has been assessed for this report.) For the purposes of this report, the generic term “lake acre” refers to both reservoirs and lakes.

By using available data, the Division of Water Pollution Control was able to assess 530,629 lake acres (Figure 9). This means that 98.8 percent of the lake acres in Tennessee have been assessed (Table 5). Only assessed lake acres are included in the rating shown below.

- A total of 416,743 lake acres (78.5%) are fully supporting.
- The Division had no data that would justify the assessment of any Tennessee lake as “threatened.”
- 26,872 lake acres (5.1%) are assessed as partially supporting due to a certain degree of impairment.
- 87,014 lake acres (16.4%) are considered not supporting due to severe impairment from pollution.

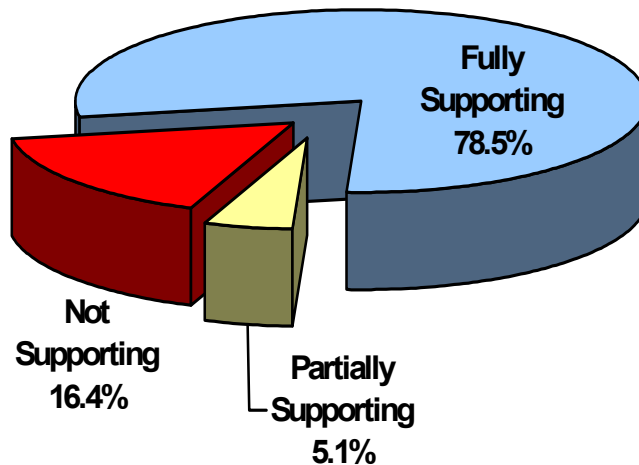
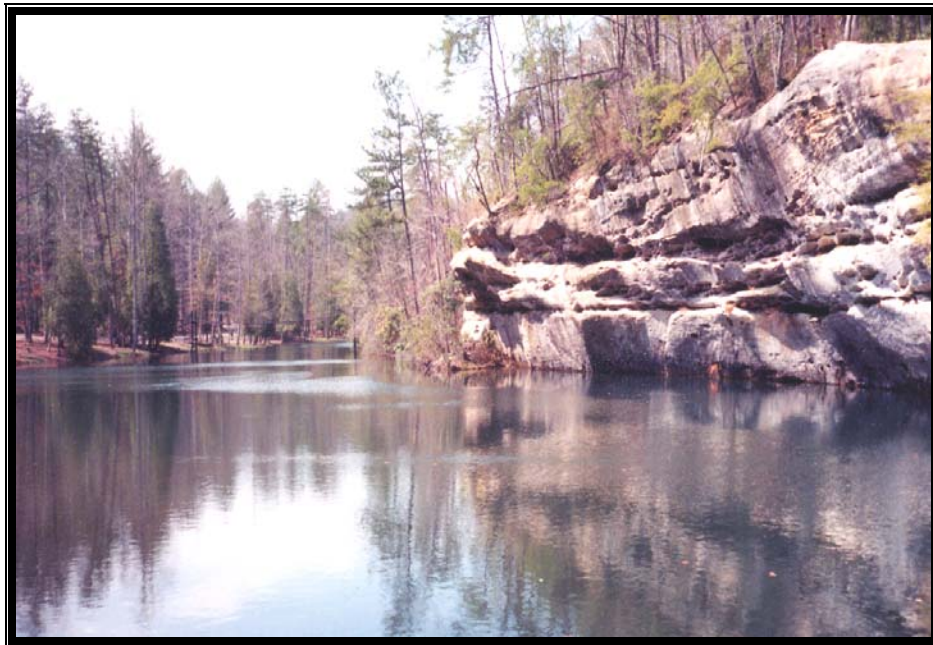


Figure 9: Percent Use Support in Assessed Reservoirs (including Reelfoot Lake).

2. Support of Individual Uses in Lakes and Reservoirs

As in streams and rivers, the two most commonly violated use designations are fish and aquatic life and recreation (Table 6). However, these were the only two classified uses violated in reservoirs and lakes. Recreational use was the most frequently violated classified use. Twenty percent of the reservoir/lake acres exceed recreational use standards. Less than four percent of the reservoir/lake acres exceeded fish and aquatic standards. All other designated uses were fully supporting all assessed acres (Figure 10).



Pickett State Park Reservoir (Photo by Kim Sparks, Planning and Standards.)

Table 6: Individual Classified Use Support for Reservoirs and Reelfoot Lake

Designated Uses	Acres Classified	Classified Acres Assessed	Acres Meeting Use	Percentage of Assessed Acres Meeting Use*
Fish and Aquatic Life Protection	536,794	524,929	505,521	96.3%
Recreation	536,794	494,489	394,422	79.8%
Irrigation	536,794	495,219	495,219	100%
Livestock Watering and Wildlife	536,794	366,015	366,015	100%
Domestic Water Supply	505,457	505,162	505,162	100%
Navigation	260,664	260,664	260,664	100%
Industrial Water Supply	430,957	395,542	395,542	100%

Note: Reservoirs are classified for more than one use, but may or may not have all uses impacted. Thus, this table cannot be used to derive percentages for overall use support in Tennessee. Also, assessment rates for individual uses may not match overall use assessment rates.

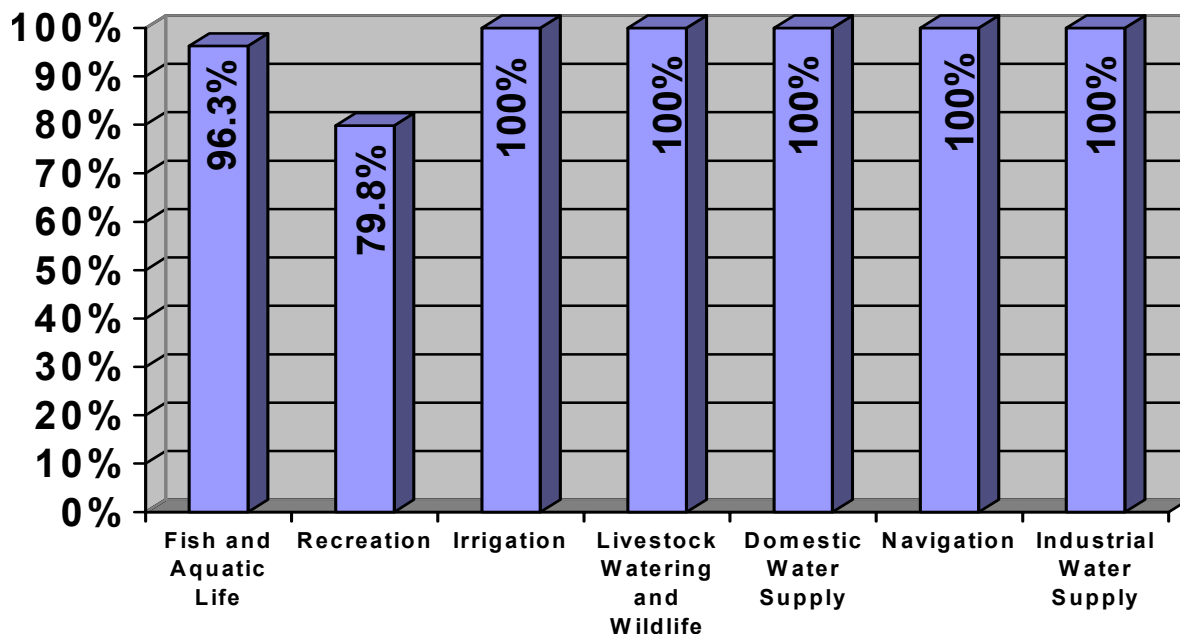


Figure 10: Percent Use Support for Individual Uses in Assessed Reservoirs and Reelfoot Lake

C. Water Quality in Wetlands

Wetlands are some of Tennessee's most valuable natural resources. Wetlands serve as buffer zones along rivers, help filter pollutants from surface runoff, store floodwaters during times of high flows, provide spawning areas for fish, and serve as repositories for specialized plants and wildlife species. Over the last century, Tennessee has lost hundreds of thousands of wetland acres. This loss represents over 60 percent of Tennessee's wetlands. Today, approximately 787,000 acres of wetlands remain in Tennessee.

The largest single cause of impact to existing wetlands in Tennessee is loss of hydrologic function due to channelization and leveeing. These changes to wetlands were done initially to prevent flooding. Unfortunately, instead of preventing flooding, it merely diverts water downstream.

Another significant impact in wetlands is siltation. Siltation is the movement of soil from the surrounding land into a waterway. Sources of silt include runoff from farms or construction projects like roads, shopping centers, and golf courses. Proper soil conservation practices at these sites are critical to prevent further siltation. While land development contributes most of the pollution, a few wetlands have been contaminated by historical industrial activities. Several of these wetlands are now Superfund sites.

Tennessee's Wetlands Conservation Strategy was first published in 1989, in cooperation with state and federal agencies, to plan for the protection and restoration of wetlands. Tennessee was one of the first states in the nation to have a protection strategy and has been recognized by EPA as establishing a national model for wetlands planning. To view

the strategy, visit the web site at <http://www.state.tn.us/environment>.

Tennessee Wetland Atlas

Estimated Number of
Historical Wetland
Acres.....1,937,000

Estimated Number of
Existing Wetland Acres.....787,000

Percentage of Historical
Acres Lost60%

Number of Existing Wetland
Acres Considered Impacted
by Pollution and/or Loss
of Hydrologic Function.....54,811

Tennessee has sought to stop the decline in wetlands through the implementation of a "no net loss" policy. This policy includes purchasing wetlands, establishing mitigation banks, and the issuance of permits.

The Division has identified 54,811 impacted wetlands acres. Wetlands that have been altered without prior approval and have not yet been adequately restored are considered impacted. Also sites that were not altered according to the approved plan are considered impacted. In instances where the wetland was altered, but the state received compensatory mitigation for the

loss of water resources, the resource was not considered impacted.